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(54) Abstract Title  
Flame Effect Inserts for Solid Fuel Stoves

(57) A removable, low voltage or battery powered device for insertion into a solid fuel stove provides the illusion of burning fuel when, mainly during the summer months, heat from the stove is not required and the stove is not lit. The device consists of a translucent fuel bed 12, lamps 14 and a means 16 for interrupting the flow of light from the lamps. The image of the fuel bed is projected onto a screen 24 which may be partially reflective 24a.

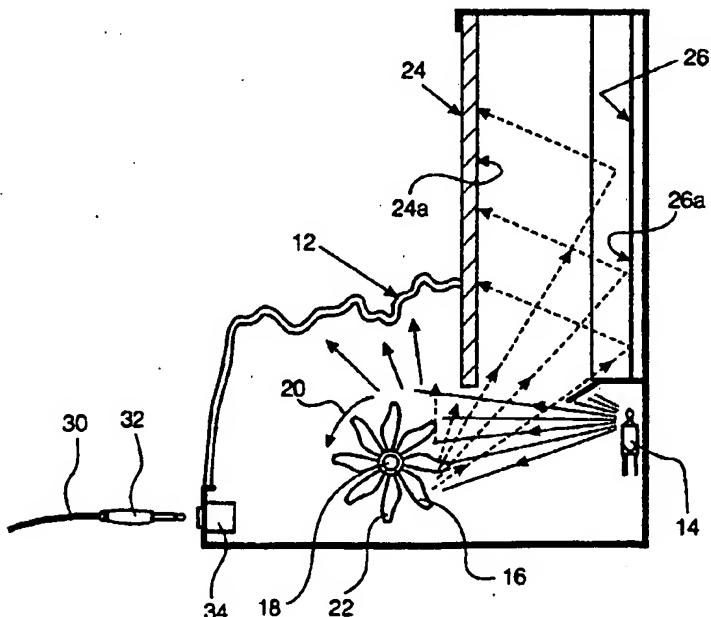
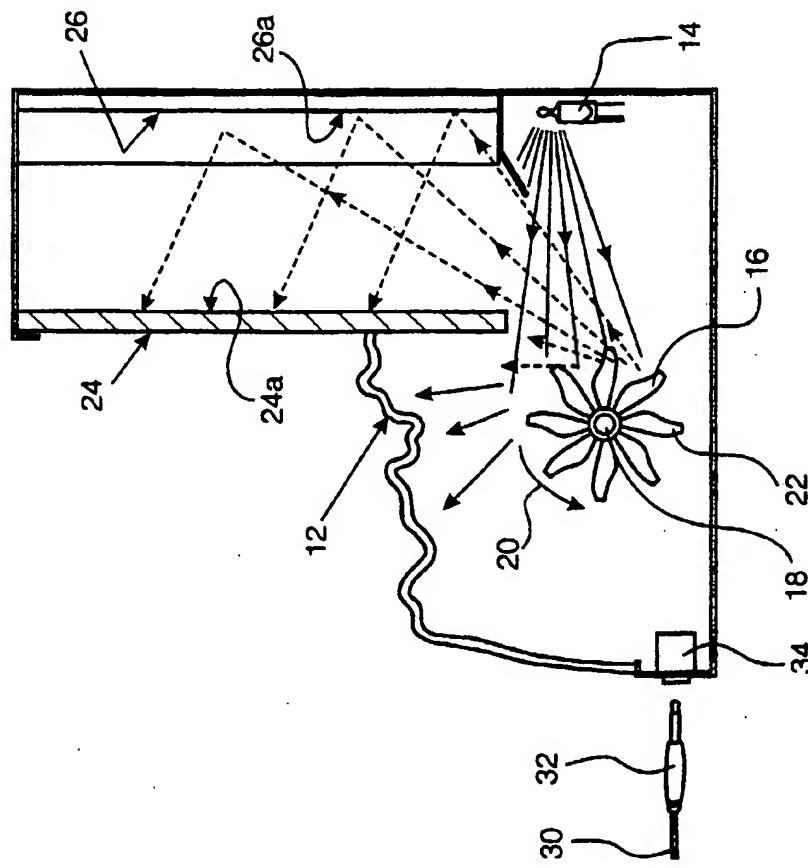
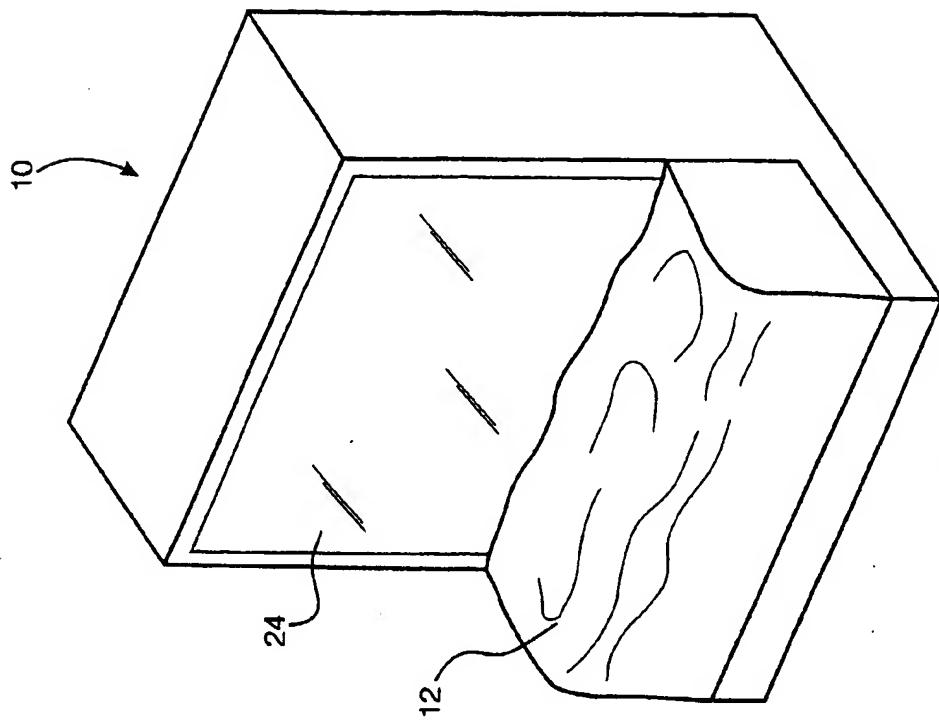


Fig. 2

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**Flame Effect Inserts**

The present invention relates to flame effect inserts, and in particular, to flame effect inserts for use in solid fuel heating stoves.

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During the colder periods of autumn, winter and spring, solid fuel heating stoves are very popular for providing space heating in houses and other buildings. In addition to providing heat, solid fuel stoves are visually attractive and interesting because of the moving and flickering light from the flames and the glow of the embers in the 10 fuel bed. However, at warmer times of the year when the stove is not lit (as no heat is required), the stove is perceived to be much less attractive. Accordingly, the present invention seeks to improve the visual attractiveness of solid fuel stoves when such stoves are not being used for heating by providing a device for insertion into the 15 stove which is viewable through the window of the stove (which is usually provided in the front door of the stove used for inserting fuel and lighting the fire), which device can provide a visual effect of glowing embers and/or moving flames. By providing a glowing ember and/or flame simulating effect, the visual attractiveness of the stove is much improved. This benefit could also be of advantage when displaying new stoves for sale in shops.

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Electric heating appliances which include means for simulating a solid fuel fire (ie glowing embers and/or moving flames) are known in the art and examples of such devices are described in GB2 230 335 and GB 2 180 927. An earlier example of such a fire is described in GB 957 591.

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In designing a device which can be inserted into a solid fuel stove in order to provide flame and/or ember effect, attention must clearly be given to electrical safety. As used in flame effect electric fires, the flame effect and ember effect components are not accessible in normal use by the user (other than the operating switches or 30 controls) and the flame effect components are designed to work at normal mains voltage (ie approximately 240V). In order to provide a flame/ember effect insert for

a solid fuel stove, the wire or cable supplying electricity to the insert will normally, in use, pass into the body of the stove. Conveniently, the cable passes through the door opening of the stove. However, this provides a possible danger in that the stove door when closed could trap the cable and, if the insulation is breached, the stove itself 5 could become live. As solid fuel heating stoves are not normally earthed, this would be especially dangerous. To overcome this problem, the applicant has designed an insert which operates at a relatively low voltage, such as not more than about 24V preferably about 12V.

10 For a better understanding of the invention, and to show how the same may be carried into effect, reference will be made by way of example only to the following drawings, in which:

Figure 1 is a schematic perspective view of a device according to the invention; and  
15 Figure 2 is a cross-section through a device according to the invention.

Referring now to the drawings, the device of the invention comprises a housing 10 incorporating a simulated fuel bed 12. The simulated fuel bed 12 may be made from a moulded plastic which is coloured to resemble pieces of burning solid fuel such as 20 wood or coal and to resemble the embers and/or ashes below the pieces of fuel. If desired, the fuel bed can be constructed to accommodate separate pieces of simulated fuel (or even real fuel) which rest on the fuel bed. The fuel bed is translucent in at least some areas, to allow transmission of light from below, thereby giving the effect of heat and burning. A lamp 14 is provided in the housing, generally below the fuel bed, in order to illuminate the fuel bed. A halogen lamp of about 5w is particularly 25 suitable. Means 16 are provided for intermittently interrupting the light from the lamp 14 before it reaches the fuel bed. In this way, the changes in intensity of light from a real burning fuel bed are simulated. In the example illustrated in Figure 2, the means 16 comprises a central axle or axis 18 which is mounted substantially 30 horizontally below the fuel bed. The axle is rotated by a motor (not shown) as indicated by arrow 20. Depending generally radially from the axle are a number of

members 22. As the axle rotates, these members 22 serve to interrupt the light from the light source. Preferably, at least some of the members 22 are reflective in order to reflect light from the light source. This can enhance the appearance of the changing intensity of the fuel bed 12. The members 22, which may comprise, for 5 example, metal strips, may also be coloured with flame-like colours, such as areas of orange, green and blue. Light from the light source 14 may fall directly on the underside of the fuel bed 12, in addition to light interrupted (and reflected) by the means 16.

10 In especially preferred embodiments, the device further comprises a first screen 24 mounted directly behind the fuel bed. The front surface of the screen 24 is made partially reflective so that an observer can see a reflection of the fuel bed in the screen. This gives the effect of a deeper fuel bed, so that the overall depth of the device can be made smaller. Also, as described below, reflective screen 24 enhances 15 the illusion by allowing the simulated flames to appear to come from the centre of the fuel bed.

In addition to the first screen, the device 10 preferably also comprise a second screen 26 mounted towards the rear of the housing, behind the first screen 24. The second 20 screen 26 includes at least some areas which are reflective. Some areas which are matte and so non-reflective may also be provided. The screen 24, in addition to having a partially reflecting front surface is also able to transmit light. Thus, light from the light source 14 is reflected by the means 16 onto the second screen 26. The reflective areas of the second screen 26 reflect the light through the first screen 24. 25 Preferably the first screen 24 is also partially diffusing. The second screen 26 is desireably patterned with reflective and non-reflective areas, the reflective areas being for example, generally flame shaped. The reflective and/or non-reflective areas of second screen 26 may also be coloured. Thus, the reflective areas can be coloured orange, green or blue and the non-reflective areas can be a matte black. The screens 30 24 and 26 provide an effect of flames as an image in the screen 24, so that the flames appear to arise between the fuel bed and its reflection. The movement of the means

16 causes the light from the light source 14 to be reflected as "moving beams", giving movement (and a greater degree of reality) to the simulated flames. A shield 28 is provided to prevent light from light source 14 from falling directly on the rear surface of screen 24. In alternative constructions (not illustrated) the screen 26 may 5 be absent and the rear of the housing 10 may be generally non-reflective. In this case, means may be provided between the rear of the housing 10 and the first screen 24 in order to provide the simulation of flames. Such means may comprise suitably shaped pieces or strips of a light silk-like material which can reflect light from the means 16 (or directly from the light source 14, if the light source 14 is located nearer the front 10 of the housing e.g. directly beneath the fuel bed) so that the reflected light is transmitted through the screen 24. Means, such as a fan for causing the movement of air, may be provided to cause movement of the material, thereby to enhance the effect of moving flame. The fan is selected to be suitable for operation at low voltages, such as 12V or 24V.

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In another alternative construction an additional fuel bed may be provided between the screens 24,26. In some cases, this fuel bed may replace the fuel bed 12. In this construction, the inner surfaces 24a, 26a of the screens are made reflective. In this way, the user perceives multiple images of the fuel bed, providing the illusion of a 20 fuel bed of greater depth. The means 16 serves again to provide the effect of changes in intensity of the glowing embers.

Electric power for the lamp 14 and the motor which moves the means 16 is provided through a cable 30, preferably with a plug and socket 32, 34. The electricity is 25 supplied at a safe voltage which will generally be about 24V or less, preferably about 12V. A transformer (not illustrated) is provided to step-down the mains voltage to the desired safe voltage. Alternatively, the device may be powered by electric cells (batteries) mounted in the housing.

## Claims

1. A device for inserting into a solid fuel stove to simulate burning fuel, the device comprising a housing, a simulated fuel bed mounted in the housing, at least 5 parts of which fuel bed are translucent, a light source for illuminating the fuel bed and means, mounted between the light source and the fuel bed, for intermittently interrupting the light from the light source thereby to provide an effect of glowing embers, wherein said light source is operative at a voltage of not more than about 24V, preferably 12V.
- 10 2. A device as claimed in claim 1 wherein comprising a motor operative to rotate said means for interrupting the light from the light source, which motor is operative at a voltage of not more than about 24V, preferably 12V.
- 15 3. A device as claimed in claim 1 or 2 comprising a transformer disposed outside the housing, and a cable for connecting the transformer to electrically operated components of the device, which transformer is adapted to transform mains voltage to a voltage of not more than about 24V, preferably 12V.
- 20 4. A device as claimed in claim 1 or 2 further comprising one or more electric cells for supplying electricity to electrically operated components of the device.
- 25 5. A device as claimed in any of claims 1 to 4 wherein the means for interrupting the light from light source includes reflective surfaces for reflecting light from the light source.
- 30 6. A device as claimed in any preceding claim further comprising a first screen mounted substantially vertically in the housing adjacent a rear edge of the simulated fuel bed, wherein said first screen has a reflective front surface thereby to provide an image of the fuel bed in the screen.

7. A device as claimed in claim 6 wherein the first screen is partially transmitting and partially reflective of light and wherein the device comprises a second screen mounted behind the first screen, at least portions of which second screen are reflective, whereby light from the light source may be reflected by the  
5 second screen and subsequently transmitted by the first screen.

8. A device as claimed in claim 7 wherein light is reflected from the means for interrupting light from the light source onto the second screen.

10 9. A device as claimed in claim 7 or 8 wherein the second screen includes a pattern of reflective and non-reflective areas to provide an image of flames.

10. A device as claimed in any of claims 6 to 9 including a shield to prevent light from the light source from falling directly on the first screen.  
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11. A device as claimed in any preceding claim wherein the means for interrupting the light from the light source comprises a substantially horizontally mounted axis member disposed generally below the fuel bed, and a plurality of substantially radially dependent members mounted along and around the axis.  
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12. A device as claimed in claim 12 wherein at least some of the radially dependant members are reflective.

13. A stove including a device as claimed in any preceding claim.  
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Application No: GB 0120978.2  
Claims searched: All

7 Examiner: Rosalind Lyon  
Date of search: 5 February 2002

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T): F4W

Int Cl (Ed.7): F24B (1/18), F24C (3/00, 7/00)

Other: ONLINE DATABASES: WPI, EPODOC, JAPIO

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2322185 A HARCOMBE See especially description on pages 5 and 6. Note flickering, low voltage (battery), flame simulation.	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
		E	Patent document published on or after, but with priority date earlier

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